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Olga Volkoff
Richard Ivey School of Business

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Olga Volkoff, Richard Ivey School of Business, ovolkoff@ivey.uwo.ca

Abstract

The central challenge of an ERP implementation is the adaptation process that brings an organization's existing operating processes and the software's embedded functionality into alignment. Two case studies were performed and analyzed using the structurational model of technology. In this way several critical elements of the adaptation process were identified.

Introduction

The implementation of ERP systems is complex, organizationally disruptive, and resource intensive. Unfortunately existing implementation research has paid scant attention to the problems associated with large packaged software (Gable, 1998). In general, prior studies focused either on the design and development of proprietary software, or on the installation and use of finished products. No studies have explored the tailoring of generic software packages to meet organizational requirements. This adaptation process – bringing an organization's existing operating processes and the software's embedded functionality into alignment through a combination of software configuration and organizational change – is the central challenge of ERP implementations.

The implementation of an ERP can take anywhere from several months to several years to complete. Advance planning can identify at a high level the specific organizational processes that will be affected and indicate the broad changes that will be required. However the detailed plans for bridging gaps between what the software offers and what the organization wants emerge over the course of the implementation, and the outcome is indeterminate. This paper reports on two case studies that were conducted to explore the adaptation process and identify some of its salient dimensions. Viewing the findings through the lens of structuration theory in general (Giddens, 1979, 1984) and the structurational model of technology in particular (Orlikowski, 1992; Orlikowski and Robey, 1991) illuminates important aspects of the ERP implementation process.

Theoretical Background

From the perspective of structuration theory, adaptation is the joint effect of the actions of individuals and the institutional structures within which those actions take place. Structures such as business strategies, organizational culture, reward and control systems, patterns of communication, and professional norms both enable and constrain the daily activities of people, but do not wholly determine them. At the same time, while individuals can choose to act in ways that will either reinforce or alter those structures, their choices are not independent of the structures within which they take action. This "duality of structure" - the recursive (re)production of institutional structures through the on-going daily social practices of individuals - allows change to emerge in ways that are not wholly predictable.

The three basic elements of this duality are the production of meaning, the exercise of power, and the invocation of social norms. Individuals act and interact on the basis of a shared understanding of their situation; through action that understanding evolves. Similarly, action depends on capability, and mobilizing the resources that deliver capability requires the exercise of power. Actions are also more or less likely to occur, or to be effective, depending on whether they are judged as legitimate or illegitimate according to the social norms of the organization.

The structurational model of technology (Orlikowski, 1992) extends this view of social systems by highlighting technology as one specific structural property of an organization. Orlikowski considers three elements - human agents, technology and institutional properties - and identifies four types of influence that these elements exert on each other. First, technology is a product of human action, both in its original physical construction, and in its later social construction through use. Second, technology is a medium of action, facilitating and constraining activities through built-in features that both reflect certain interpretations and social norms, and offer specific capabilities. Third, institutional properties, such as standard practices, organizational needs, and available resources, condition the way individuals interact with technology. Finally, that interaction is likely to have institutional consequences by either reinforcing or transforming existing institutional structures.

Orlikowski and Robey (1991) develop this model further by noting that technology (and in particular information technology) is an integral part of the structuration process, impinging on each of the three modalities identified by Giddens – meaning, power, and social norms. IT both embodies and encodes existing understanding and contributes to the creation of new meaning. It is a key organizational resource, providing

power to some individuals, enhancing certain capabilities and restricting others. It also legitimizes certain ways of performing tasks through embedded routines and rules. Orlikowski and Robey further suggest that this framework is particularly useful for guiding future research on both the systems development process and on the consequences of information system use.

The implementation of an ERP system is fundamentally different from traditional systems development, and is also distinct from system use. However it does contain elements of both. For example, the first step in tailoring the software to fit organizational processes, (or making the decision to change operating procedures to fit the software) is to have users analyze and document their business processes and identify organizational requirements. On the other side, since an ERP does have a basic built-in structure, to some extent the organization must learn to use what is there. The adaptation of software and organizational processes is an iterative process entailing on-going social action that is clearly constrained by both the structural properties of the organization and the built-in properties of the software. The actions of the project team and other members of the organization will alter some of these properties and reaffirm others. Seen through the lens of the structurational model of technology, the discussion of the two cases that follows suggests some of the important dimensions of the adaptation process.

The Cases

A Canadian manufacturer of packaged food products (PFP) implemented several modules of SAP's R/3 software over a thirteen-month period ending in April 1998. PFP operates four manufacturing plants and three sales offices across Canada. The company's decision to replace its fifteen year old legacy system was based largely on the need to become Y2K compliant, but was also motivated by a desire to pursue specific strategic opportunities that were not supported by the existing system. The project team responsible for the implementation consisted of five users, four members from IT, an IT leader and an overall project leader. They were joined by a team of consultants that varied in number and membership, but averaged six people. Some were responsible for module configuration, and others worked on building programming interfaces and creating reports.

The study was conducted several months after the system went live. Semi-structured interviews lasting at least one hour and usually longer were conducted with eight of the eleven members of the project team, a programmer, and a senior manager who was a member of the steering committee. In addition documentation such as the project plan was reviewed.

The second study examined a Canadian university's (UNI) implementation of four modules from PeopleSoft. Each module had its own project team, working in its own separate location, with an overall project manager and steering committee to ensure coordination. The study focused on one of the modules, several months before it went live on the first phase. This team had eleven users and five technical resource people, and was supported by three consultants. Semi-structured interviews were conducted with six members of the project team, a number of the weekly project team meetings were attended, and the walkthrough of a largely finished prototype was observed.

While an interview protocol was used to maintain some consistency across interviews, and to ensure that the various elements of the theoretical perspective selected were addressed, interviewees were encouraged to talk about any issues that they felt were important. A number of key themes emerged from the analysis of the interviews.

The most startling change in both cases was in the mindset of the users on the project teams. Individuals at PFP made statements such as "[the software] changes the way you think about [a specific type of information] because SAP treats it differently…it was a big thought process change," and that they had to "translate user requirements into SAPanese." At UNI one user talked about "changing from trying to map from my world into PeopleSoft, to asking what will make this system work, mapping from PeopleSoft into my world." Another user coined the expression "going through the window" to describe how she started viewing things from a different frame of reference. In the context of the structurational model of technology, these individuals provided clear evidence of how meaning was reconstructed. Specifically the "structures of signification" built into the software competed with those which had been embedded in the institutional properties. To begin with, team members approached configuration with an understanding of organizational processes based on institutional norms. As the project progressed, the technology constrained and altered the way they thought about organizational processes. As this new way of thinking became routine, the interaction between the technology and the project team led to changes in the institutional properties, with the team reinforcing the meaning embedded in the software – the revised versions of organizational processes – during the configuration activities.

Facilitating this shift in perspective was a change in the social norms. In both projects, participants talked about the special relations they built up within the team. At PFP individuals talked about how their behaviour in the project room was quite different – more casual and familiar – compared to how they had acted in their previous positions. Many were also reluctant to leave the

team when the system went live – they knew they had changed and weren't sure how they would "fit in" with their previous colleagues. In particular, the new norms included support for thinking about organizational processes in new ways. Similar sentiments were expressed at UNI. These changes in social norms, the result of an extended and intense period of working together as a special team, apart from the rest of the organization, facilitated the shift in mindset that promoted viewing organizational processes from the perspective of the software. At the same time, while the new social norms among team members may have helped to legitimize new ways of thinking, they also had the unintended consequence of making these same team members somewhat illegitimate "back home".

Additional support for the mindset change was derived from the exercise of power. In particular, the provision of significant organizational resources – funding and expertise – gave the project team members a measure of authority. At PFP the "new" ways of thinking prevailed because of "an unspoken rule not to criticize the project." This reinforced adaptation through changes to the organization rather than through changes to the software. Even so, previous power structures were not totally altered. Some members of the project team indicated that, in retrospect, they had accommodated more user requests for small changes to the software to make it resemble the old system than they perhaps should have. Apparently institutional properties managed to exert some influence on the interactions between the team members and the technology.

In conclusion, viewing these cases through the lens of the structurational model of technology highlighted several salient dimensions in the adaptation of software and organizational processes to each other. The key element is the influence the technology had on the creation of new structures of signification. While this critical change was supported both by changes in social norms and by the exercise of the power accruing to the status of the project, these latter changes had two potentially negative unintended consequences. First, the new social norms that developed among project team members created difficulties for the individuals at the end of the project - and heightened the probability that they might be lured away. Second, while the status of the project helped in the imposition of organizational change, it also reduced the likelihood that the team would receive useful feedback from others in the organization.

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